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FUSIFORM RUST ON PINES

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FUSIFORM RUST ON PINES

Most Georgians have seen the spindle-shaped swelling on branches and stems of loblolly and slash pine trees. These swellings are especially noticeable in early spring when they're covered with blisters filled with orange powder (spores). The fungus *Cronartium fusiforme* causes this disease. It is commonly called southern fusiform rust, canker rust, cronartium rust, fusiform canker or simply fusiform rust.

The disease is most damaging on slash and loblolly pines. It occurs to a lesser degree on longleaf, and is not a problem on shortleaf pines.

Losses to this disease amount to millions of dollars a year from the death of infected trees and from its degrading effect on products cut from the tree. Trees with stem cankers are unsuitable for poles or pilings. Most waste will be incurred in cutting lumber and other products from them.

It is difficult to place a dollar value on pines in the home landscape lost to this disease every year. Its importance here is its destruction of beauty and design.

How It Spreads

Fusiform rust spreads by means of fungus spores (the fine orange powder you see on fusiform swellings in early spring). These spores do not infect pines directly. They are carried by the wind to oak leaves, where spores capable of infecting pines are produced. Water, willow, laurel, southern red and several other oaks are susceptible hosts on which this transformation can take place. The rust causes a faint leaf spotting on the oaks, but does little or no harm.

Brown hair-like bristles develop on the underside of infected oak leaves. These bristles contain microscopic spores released in late spring and carried by the wind to new pine needles and branch tips. Upon germination, the fungus begins its growth and infection of the pine. This entire cycle takes place within a few weeks each spring. Most pine infections occur in April and early May in Georgia.



Wind damage to fusiform-infected pine.

ATTENTION!

Pesticide Precautions

1. Observe all directions, restrictions and precautions on pesticide labels. It is dangerous, wasteful, and illegal to do otherwise.
2. Store all pesticides in original containers with labels intact and behind locked doors.
3. Use pesticides at correct dosage and interval to avoid illegal residues or injury to plants and animals.
4. Apply pesticides carefully to avoid drift.
5. Bury surplus pesticides and destroy used containers so that contamination of water and other hazards will not result.

Acknowledgement

The authors wish to express appreciation to H. R. Powers, Principal Plant Pathologist, Fred Matthews, Research Plant Pathologist, and S. J. Rowan, Research Plant Pathologist, USDA Forest Service, Forestry Sciences Laboratory, Athens for their contributions through research and their valuable assistance in the preparation of this manuscript.



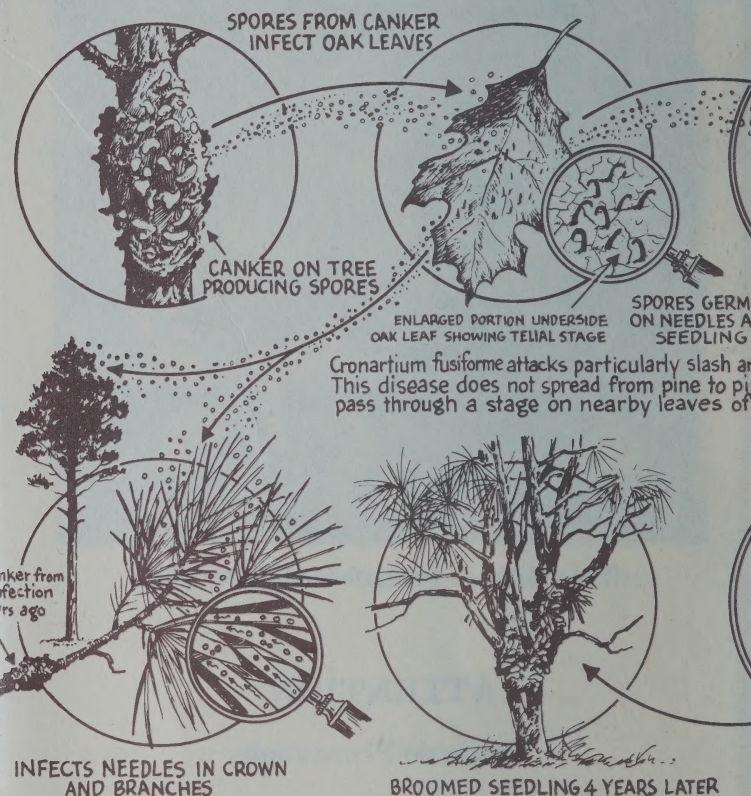
Hairlike structures on the underside of oak leaves produce the spores that infect pines.

Development of a Canker

The first visible sign of a fusiform infection is a small, elongated swelling on one side of, or completely encircling, a stem or branch. These swellings grow throughout the season, but produce orange spores only in early spring. Some cankers will not produce spores for three or four years and may appear dead, but will begin producing spores again the next year. A portion of the old canker occasionally will die. This results in a flat or depressed canker which sometimes gives off large amounts of resin.

Some people believe that fusiform may spread through the system of the tree, causing the formation of new cankers. This is not true. Each canker is the result of a separate infection and damages only that part of the tree. However, branch cankers often grow down into the trunk, and develop into a damaging stem canker.

LIFE CYCLE OF THE FUSIFORM RUST FUNGUS (C



Reducing Losses

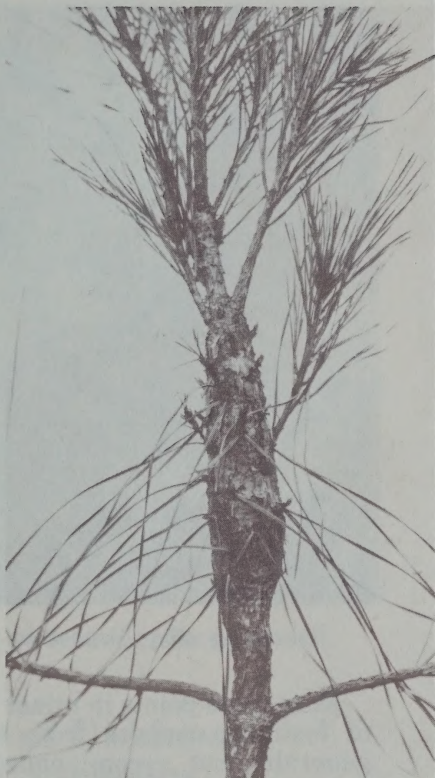
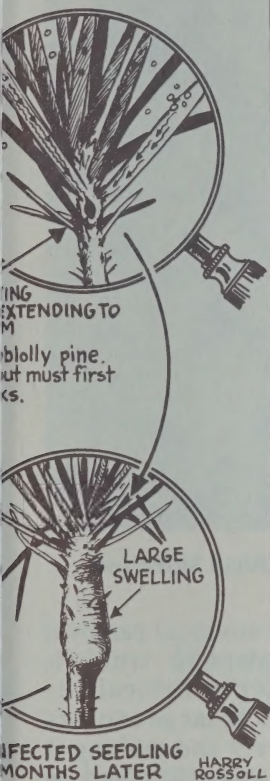
Certain precautions can be taken which will reduce or minimize damage by fusiform. By observing these precautions, you can keep infected trees to a minimum.

Plant Stock — In nurseries, fusiform infection is prevented by spraying with fungicides, such as ferbam, ziram or Bayleton from the time of seed germination until early summer. In spite of these intense precautions, infected trees occasionally may be shipped. These seedlings can be recognized by the small, spindle-shaped swellings on their stems, and should be discarded at the planting site.

Planting — If yours is an area where fusiform rust is severe, you might consider planting shortleaf or longleaf pine, which are more resistant.

Research has shown that fusiform infection is greater in sparsely stocked than in dense stands. It is also greater in rapidly growing stands than in

artium fusiforme)



Fusiform canker on young loblolly pine stem.

those with a lower rate of growth. Therefore, plantings should be at closer spacings on better sites where rapid growth is expected. Closer spacing will encourage early natural prunings of lower branches. This will minimize the spread of branch cankers into the stems.

In addition, closer spacings allow for the removal of more diseased trees while full stocking is maintained. Poor sites capable of supporting fewer stems per acre and where growth will be slower can be planted on a wider spacing. This will still allow for removal of infected trees without leading to understocking.

Young Stands — Early fertilization and cultivation, which stimulate early spring growth, favor high rust infection.

Early thinnings in young stands will minimize losses from infected trees. Consideration should be given to removing trees with stem cankers. *Stands should not be over-thinned to remove all infected*



A fully developed limb canker.

trees. The loss in total growth from over-thinning will usually be more than the possible loss from fusiform infection. In addition, opening the stand too much by over-thinning is likely to increase the number of new rust infections and hardwood competition.

Pruning out limb cankers within 15 inches of the stem will save many trees since infection will spread this distance. However, this practice can usually be justified only in high value stands or over small areas.

Older Stands — Studies have shown that loblolly pine sawtimber trees with as much as half their trunk circumference infected by fusiform canker can be left in well-stocked stands with little risk of loss from wind breakage. In such stands, the location of cankers and their influence on products to be cut from the tree are more important to the market than the risk involved in leaving them. Again, it is important that adequate stocking be maintained.

Homeowners — If fusiform rust is severe in your area, you might consider selecting shade trees other than slash and loblolly pine. If either slash or loblolly pine is an important part of the landscape, protecting them with a fungicide spray program until they are at least five years old is one possibility. Protection and preventing infection is very important, since we are unable to recommend a successful treatment once a pine is infected. Apply fungicides from the first of May to mid-June. (See Table 1 for recommended chemicals.)



Old infection on loblolly pine stem.

Beware of Unknown Tree Surgeons

Many homeowners have so-called tree surgeons knock on their doors in early spring when the orange spores show up on pine cankers. They insist they should be allowed to cut out stem and branch cankers to save the tree. Some even guarantee their work for a year. Such a guarantee is worthless; the orange spores will not appear until next spring even if nothing is done.

FUNGICIDES CLEARED FOR FUSIFORM

Chemical	Rate
Bayleton (50%)	4 to 16 oz/20 gals.
Ferbam (75%) ^a	2 lbs./100 gals. (1 Tbsp./gal.)
Ziram (76%)	2 lbs./100 gals. (1½ Tbsp./gal.)

^a Cleared for use by homeowners and commercial applicators.

^b These chemicals are protective fungicides which function only as a barrier b
period after the first application and mid-June can wash off the fungicides

* Read the label. If a wetting agent or spreader-sticker is not included, add elt



Brooming effect caused by fusiform infection.

Keep these points in mind: The surgical removal of fusiform cankers from the stem or trunk is generally not recommended. It is difficult to remove all the infected tissue around large cankers without weakening the tree severely and making it susceptible to wind breakage. Small cankers can be successfully removed. However, they rarely penetrate deep enough to weaken the tree substantially.

Limbs that are cankered within 15 inches of the trunk should be pruned. Limb cankers more than 15 inches from the trunk are of no importance, since infection will not spread this distance.

RUST PREVENTION ON YOUNG PINE*

Remarks

Repeat at 2- and 3-week intervals depending on disease pressure. A maximum of four 16 oz. applications may be applied per year.
Repeat at 5-day intervals until mid-June.^b

Repeat at 3- to 5-day intervals until mid-June.^b

between Fusiform spores and pine branches. Frequent or heavy rains during the , necessitating more frequent applications.
her a commercial additive or 1-2 drops of liquid detergent per gallon of spray.



Wind damage to fusiform-infected pine.

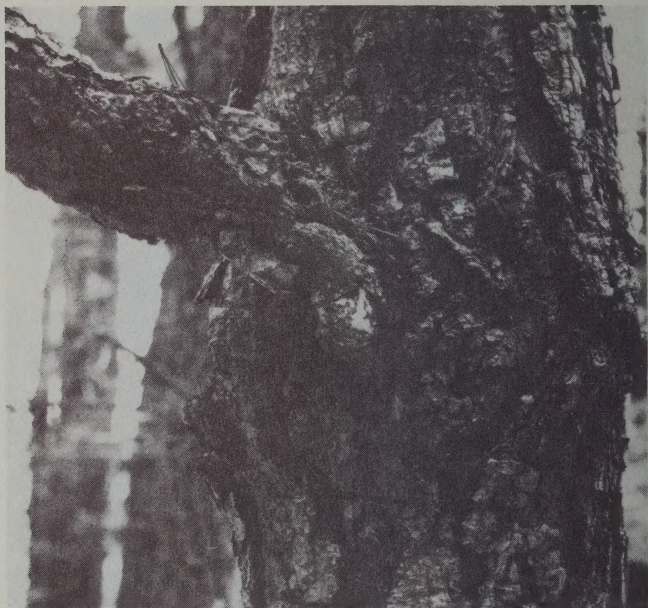
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Main stem infected by an old limb canker.

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